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UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
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Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0 745 746 A1 (MITSUI) see column 7/column 8	1
X	WO 96/28666 A1 (STONERIDGE) see page 13, last para.	1
X	US 5 516 164 A (OHI) see col. 4, para 4	1
A	US 5 088 347 A (AUTO-VATION) see col. 7/col. 8	1
A	US 4 966 266 A (MITSUI) see col. 4, lines 6-10	1
X	US 4 948 183 A (MITSUI) see col. 4, para 4	1
X	US 4 763 936 A (GM) see col. 8, para 2	1

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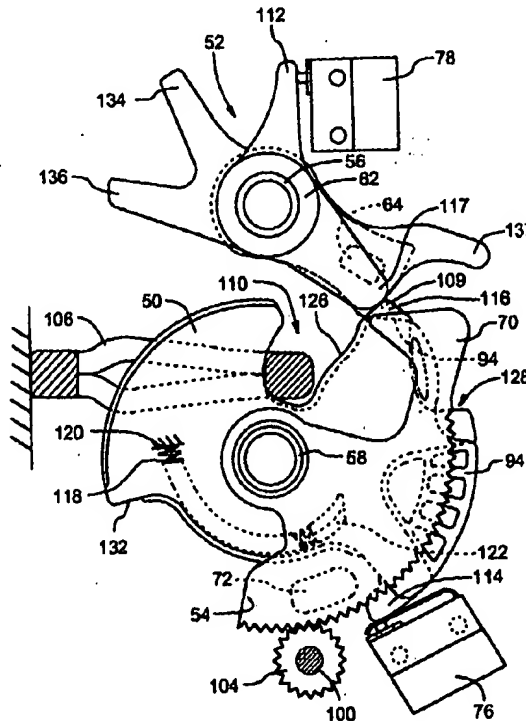
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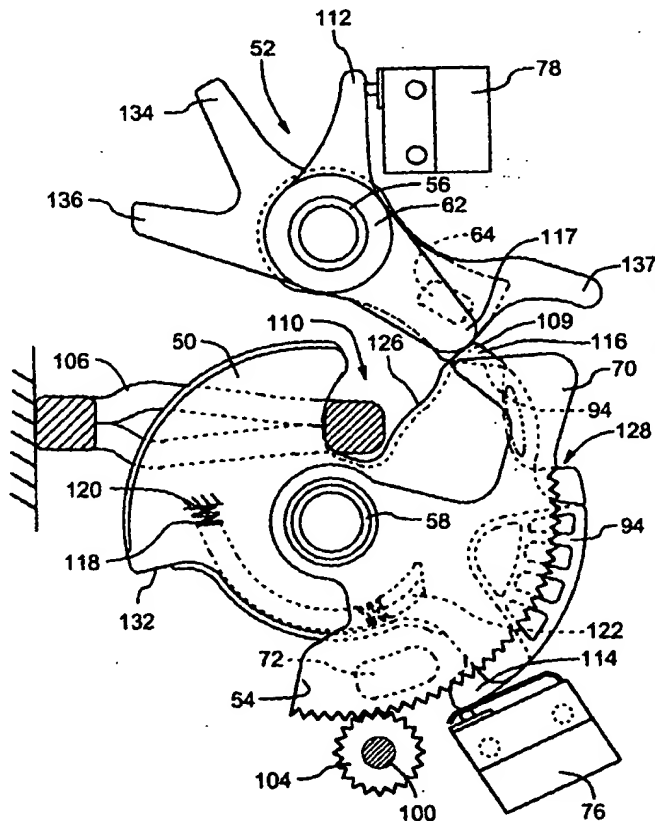
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POWER DOOR LATCH ASSEMBLY

Field of Invention

This present invention relates to a latch assembly for latching and unlatching a member
5 to and from a pillar. In particular, the present invention relates to a power door latch assembly
for securing and unsecuring a vehicle door.

Background of the Invention

A typical motor vehicle door is mounted in a door frame on the vehicle and is movable
between open and closed positions. Usually the door is held in a closed position by the latching
10 engagement between a spring-biased ratchet pivotally mounted inside the door latch and a U-
shaped striker secured to the door frame. The ratchet is most often spring-biased toward the
unlatched position to release the striker and is maintained in the latched position to hold the
striker by a spring-biased pawl or other mechanical structure. The ratchet cannot pivot to release
the striker until the pawl is moved.

15 The majority of these door latches are exclusively manually operated both to unlatch the
door and to relatch the door. Typically, manual release handles are provided on the inside and
outside of the door to release the ratchet from the striker by moving the pawl so that the door can
be opened. The door is closed and relatched by manually pivoting the door so that the ratchet
impacts the striker with sufficient force to pivot the ratchet to the latched position against the
20 spring force exerted by the ratchet spring.

It is often difficult, however, to completely close and latch manually latching vehicle
doors on current model vehicles because the desire to reduce vehicle weight and to improve fuel
economy has led engineers to design vehicles with relatively thin and lightweight doors. Often
relatively hard door seals are used with these thin, lightweight doors to improve sealing around
25 the door, particularly at high driving speeds. Because many vehicle doors are relatively
lightweight and have relatively hard door seals, many vehicle doors often have insufficient
inertial energy when pushed closed to compress these hard door seals and fully pivot the ratchet
to the latched position to latch the door.

Power assisted door latch assemblies have been developed to overcome the problems
30 associated with latching doors with lightweight construction and hard door seals. Power assisted
door latch assemblies allow low inertial energy or "soft" closure of the lightweight doors without
the need to slam the door even with the increased seal pressure that results from relatively hard
door seals. Existing power assisted door latch assemblies typically function to latch a vehicle
door in one of two ways: 1) by forcing the ratchet to pivot in the closing direction after
35 engagement with the striker or 2) by forcing the striker to move in a door-closing direction after
the striker is fully engaged with the ratchet.

Use of either type of power assisted door latch assembly decreases the noise associated
with door closing and decreases the manual effort needed to completely close the door. Power
assisted door latch assemblies are disclosed by Ishikawa (US 4,986,579), Kobayashi (US

5,273,324) and Dowling (US 5,520,425). In Ishikawa, the door latch assembly includes an electric motor for rotating the spring-biased ratchet from the partially closed to the fully closed position, and an electric switch for activating and deactivating the electric motor. In Kobayashi, the door latch assembly includes a rotatable lever for rotating the ratchet plate into the fully closed position, an electric motor for manipulating the lever, and a mechanical linkage extending between the lever and the ratchet plate for rotating the ratchet plate into the fully closed position. In Dowling, the door latch assembly includes a motor driven gear, and a flexible wire extending between the driven gear and the ratchet for rotating the ratchet from the partially closed to the fully closed position. However, Ishikawa requires a complex rotary actuator for operating the switch, whereas the mechanical link and the flexible wire used respectively in Kobayashia and Dowling inefficiently transfers mechanical torque between the electric motor and the ratchet plate.

Latch assemblies which provide both power assisted opening and power assisted closing are also in use. In these power assisted latch assemblies, the same source of power, typically an electric motor mounted within the vehicle door, is used both to open the latch and to close the latch. The mechanical locking mechanism and some door opening handles can be eliminated from the vehicle door when these latch assemblies are used.

Power assisted opening and closing latch assemblies are taught by Bernard (US 4,664,430), Kleefeldt (US 4,518,180) and Tamiya (US 5,232,253). These types of latching assembly are often advantageously used with powered sliding vehicle doors in which the latch must be released before the power door opening mechanism can be actuated to open the door. Bernard uses a cylindrical ratchet plate and a disc rotatably mounted on a common shaft, a pawl pivotally mounted on the disc for engagement with the ratchet plate, and an electric screw drive for rotating the disc between an open latch position and a close latch position. Kleefeldt uses a motor-driven gear and a sliding toggle linkage mechanically coupled to the driven gear for opening and closing the ratchet. Tamiya uses a rack-driven link for rotating the ratchet from the open position to the closed position, and a lever coupled to the link for releasing the pawl from the ratchet to allow the ratchet to be rotatably driven back to the open position. However, Bernard stresses the electric motor by using the motor as brake to retain the ratchet plate in the closed position, whereas the latching mechanisms taught by Kleefeldt and Tamiya may not be reliable in environments where the door is forcefully closed into the latch. Also, the sliding toggle linkage used by Kleefeldt limits the mechanical torque which is ultimately applied to the ratchet.

Accordingly, there remains a need for a simple, cost-effective power-assisted door latch assembly which efficiently transfers torque from the electric motor to the ratchet. Further, there remains a need for a power-assisted door latch assembly which limits the stress applied to the electric motor by the ratchet.

Summary of the Invention

According to the present invention, there is provided a power door latch assembly which addresses some of the deficiencies of the prior art.

The power door latch assembly, according to the present invention, comprises a ratchet for engaging a door striker, a pawl for engaging a detent surface provided on the ratchet for selectively resisting rotation of the ratchet towards the open position, a rotary actuator for rotating the ratchet towards the closed position and for disengaging the pawl from the detent surface, and a drive actuator for driving the rotary actuator. The drive actuator includes a prime mover, an output member in engagement with the rotary actuator, and a releasable coupling coupled between the prime mover and the output member for selectively transferring torque between the prime mover and the rotary actuator. The power door latch assembly also includes a drive controller for controlling operation of the drive actuator. The drive controller is coupled to the releasable coupling and is configured for disengaging the prime mover from the rotary actuator when the ratchet is disposed in either the open or closed positions.

According to the preferred embodiment of the invention, the door latch assembly provides for the power assisted opening and closing of a vehicle door with respect to a vehicle door frame between a closed position wherein the door is latched to a striker mounted on the door frame and an opened position in which the door is unlatched from the striker. The door latch assembly has a ratchet which cooperates with a mouth of a housing to releasably retain the striker. The door latch assembly also includes a pivotal pawl mounted in cooperating relation with the ratchet for biased movement into a holding position wherein the ratchet is held (1) in the secondary latched position against movement toward the unlatched position and (2) in the primary latched position against movement toward the secondary latched position. The pawl can be moved out of the holding position into a releasing position to allow the ratchet to move toward and into the unlatched position. The door latch assembly further includes a sector gear constructed and arranged to be moved from a null position in one direction through a closing stroke into a closing position and from the closing position through a return stroke to the null position and from the null position in an opposite direction through an opening stroke into an opening position and from the opening position through a return stroke into the null position. An actuator assembly includes a reversible electric motor and a clutch assembly for selectively driving the sector gear. The electric motor is operable (1) when energized to rotate in one direction to drive the sector gear through the closing stroke thereof and (2) when energized to rotate in an opposite direction to drive the sector gear through the opening stroke thereof. The sector gear has a closing arm constructed and arranged to cause a movement of the ratchet from the secondary latched position thereof to the primary latched position thereof. The sector gear has an opening arm constructed and arranged to cause a movement of the pawl from the holding position thereof to the releasing position thereof to release the ratchet.

Preferably, the sector gear has a spring for urging the sector gear to move through the return strokes thereof from opening and closing positions thereof when the actuator is de-energized.

Preferably the door latch assembly includes an energizing closing switch constructed and arranged to be actuated in response to the movement of the ratchet into the secondary latched position thereof to energize the electric motor to thereby move the sector gear through a closing stroke so that the closing arm causes the ratchet to move from the secondary latched position thereof into the primary latched position thereof and a closing de-energizing switch constructed and arranged to be actuated in response to the movement of the ratchet into the primary latched position thereof to de-energize the electric motor and allow the spring system to effect a return stroke of the sector gear. The power operated driving assembly further includes a manually operable opening energizing switch constructed and arranged to energize the electric motor in response to a manual actuation thereof to move the sector gear through an opening stroke so that the opening structure thereof causes the ratchet to move out of the primary position thereof to allow the door to be moved into an open position and a timer closing de-energizing switch constructed and arranged to be actuated in response to the movement of the pawl into the releasing position thereof to de-energize the electric motor after a predetermined time and allow the spring system to effect a return stroke of the sector gear.

Preferably, the ratchet and the sector gear are pivotally mounted about a common axis and the pawl is pivotally mounted about an axis that is parallel to the common axis.

Preferably, the door latch assembly includes a housing having a striker receiving opening therein constructed and arranged to be mounted in the vehicle door so that the opening receives the striker during a door closing movement. The ratchet is pivotally mounted on the housing with the striker engaging structure facing outwardly within the opening when the ratchet is in the unlatched position. The latching structure extends within the opening when the ratchet is in the latched positions. The housing carries the pawl, the sector gear and the power operated driving assembly.

25 Brief Description of the Drawings

The present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

FIG. 1 is an elevational view of the left side of a conventional four-door vehicle;

FIG. 2 is an isolated fragmentary perspective view of the interior of a front door of the vehicle shown in FIG. 1;

FIG. 3 is a perspective view at a first side of a power assisted door latch assembly embodying the principles of the present invention;

FIG. 4 is a perspective view of a second side of the power assisted door latch assembly shown in FIG. 3;

FIG. 5 is a perspective view similar to FIG. 3 of the door latch assembly with a first cover and a second cover removed;

FIG. 6 is a perspective view similar to FIG. 4 of the door latch assembly with the second cover removed;

FIG. 7 is a schematic view showing a power operated driving assembly, a power source, a voltage source and controller for the door latch assembly;

FIG. 8 is an elevational view showing a plurality of parts of the door latch assembly including a ratchet, a pawl, a sector gear, a first switch member and a second switch member in a primary latched configuration with a conventional striker shown in sectional view mounted on a door frame shown in fragmentary view;

FIG. 9 is a view similar to FIG. 8 showing the pawl in a releasing position and the sector gear in an opening position;

FIG. 10 is a view similar to FIG. 8 showing the door latch assembly in an unlatched position;

FIG. 11 is a view similar to FIG. 8 showing the door latch assembly in a secondary latched position;

FIG. 12 is a view similar to FIG. 11 showing the door latch assembly in a secondary latched position and showing the sector gear partially rotated in a closing direction; and

FIG. 13 is a view similar to FIG. 12 showing the ratchet in a primary latched position and showing the sector gear fully rotated in a closing direction.

Detailed Description of the Preferred Embodiment

FIG. 1 shows a left side elevational view of the exterior of a conventional motor vehicle 10 that has a front door 12 and a back door 14. Each door 12, 14 has an exterior handle 16 and a door latch opening button 18. The front door 12 has a conventional key-operated lock cylinder 20 to lock and unlock the door 12.

A power operated door latch assembly 22 constructed according to the principles of the present invention is mounted on each door of the vehicle 10 for the power assisted latching and unlatching of each door.

FIG. 2 shows an isolated view of the inside of the front door 12. Two hinges 24 are secured to a first inner edge 28 of the door 12 to pivotally mount the door 12 to a door frame on the vehicle 10 in a conventional manner so the door can be moved between open and closed positions. A power operated door latch assembly 22 is mounted on a second outer edge 30 of the door. The door 12 has an interior door release switch 32 to unlatch the door latch assembly 22 with power assistance and an interior manual door release handle 34 to manually unlatch the door 12 using a manual override.

A conventional U-shaped striker is rigidly secured to the door frame of the vehicle 10 in a conventional manner. When the door 12 is moved to the closed position, the door 12 pivots into the door frame and the door latch assembly 22 impacts the striker to latch the door 12.

Referring to FIGS. 3 and 4, the door latch assembly 22 includes a housing 36 and a first cover 38 and a second cover 40 secured to the first cover 38. The covers 38, 40 are secured to the housing 36 by conventional staking pins 42, 44 or other suitable fasteners. The housing 36 engages threaded holes 46 to mount the door latch assembly 22 to a door 12 with conventional bolts or other suitable means. Housing 36 has a mouth structure 31. Tab 93 on the second cover

40 extends through a slot 95 in the first cover 38 and two tabs 97, 99 on the first cover 38 clip over the edge of the second cover 40 at 101, 103 to close the door latch assembly 22.

Referring to FIG. 5, the housing 36 has a conventional bushing 58 for rotatably mounting the ratchet 50 on pin 44 (FIG. 6) between an unlatched position and a primary latched position.

5 Ratchet 50 has a conventional detent fork structure having a notch 110 presenting a primary detent surface 126. The ratchet 50 has a secondary detent 128 spaced circumferentially from the primary detent 126. The ratchet 50 has a contoured edge diametrically opposite the notch 110 presenting a cinch drive area 132 and a release clearance area 114. Ratchet 50 cooperates with the mouth 31 to engage and cinch the striker 106 (FIG. 8) to hold the door closed.

10 A ratchet spring 118 (FIG. 8) is confined within an arcuate slot of the ratchet 50. The ratchet spring 118 extends between a wall portion 120 of the housing 36 and a tab 122 secured to the inside of the ratchet 50. The ratchet 50, therefore, is mounted for biased pivotal movement into the unlatched position.

Housing 36 has a conventional bushing 56 for rotatably mounting the pawl 52 on pin 42 (FIG. 6). Arcuate slot 66 receives connecting arm 64 and allows travel of the pawl 52 between a latching position and a full release overtravel position. Pawl spring 68 extends between the housing 36 and the pawl 52 to bias the pawl 52 against the ratchet 50 to follow the contours of the circumference thereof. Housing 36 has a channel for retaining the pawl spring 68.

Referring to FIG. 6, a sector gear 54 is commonly mounted on pin 44 on a side of the housing opposite the ratchet 50. Sector gear 54 is mounted in such a manner that the sector gear 54 is able to rotate relative to or independently of the ratchet 50. The sector gear 54 has an opening arm 70 which extends tangentially from a toothed portion 55. The sector gear 54 also has a closing arm 72 which extends axially from the teeth portion 55. Coil springs 74 are mounted around sector bearing cylinder 59 with a first end 77 engaging the housing 36 and a second end 79 engaging the sector gear 54. Springs 74 bias sector gear 54 into a null position.

Housing 36 has an arcuate slot 57 through which closing arm 72 extends for engagement with cinch drive area 132 of ratchet 50. As sector gear 54 rotates, it will rotate independently of the ratchet 50 until it engages the cinch drive area 132. In the release direction, the travel of sector gear 54 is not obstructed by the ratchet 50 due to the release clearance area 114. Thus, sector gear 54 has a "lost motion" relative to the ratchet 50.

A release lever 62 is commonly mounted on housing bushing 56 on opposite sides of the housing 36 from the pawl. Housing 36 has an arcuate slot 66 through which connecting arm 64 (FIG. 5) extends coupling the pawl 52 and the release lever 62 together for pivotal movement as a single unit. Release lever 62 has a hub from which arms 112, 117 (FIG. 8), 134, 136 and 137 radially extend.

Pin 42 provides pivotal support for the pawl 52 and release lever 62 and the pin 44 provides pivotal support for the ratchet 50 and the sector gear 54. Therefore, the pin 44 defines a first pivot axis for both the ratchet 50 and the sector gear 54 and the pin 42 defines a second pivot axis for the pawl 52 and release lever 62. These two axes are essentially parallel.

A first electrical switch 76 (FIG. 5) is mounted on the housing 36 and positioned to engage the outer cam surface of the release clearance area 114 as the ratchet 50 rotates. The pivotal movement of the ratchet 50 will switch or toggle the switch 76 between an "on" state and an "off" state. A second electrical switch 78 is mounted on housing 36 and positioned to engage arm 112 of the release lever 62. The pivotal movement of the release lever 62 will switch or toggle the switch 78 between an "on" state and an "off" state. Each switch 76, 78 has two conventional electrical connectors 81 (FIG. 3) to connect the switches to a controller 108 (FIG. 7).

Wire 80 and bowden wire 82 engage arm 137 of release lever 62. The outer sheath of the bowden wire 82 is mounted to the housing to effect actuation of the bowden wires. Each end of the wires 80, 82 has a cap 87, 89 which allows the wires 80, 82 to slide relative to the release lever 62. Thus, wires 80 and 82 do not interfere with the movement of the pawl 52 between the holding and releasing positions during power assisted door opening and closing.

Referring to FIG. 7, actuator 96 is mounted on the face of the plate 40. Actuator 96 includes a motor 98 and a clutch assembly to selectively drive the sector gear 54. The second cover 40 has an opening 48 (FIG. 4) through which a drive shaft 100 extends. A drive gear 104 is mounted on the drive shaft 100 and engages the sector gear 54 to provide torque amplification for movement of the sector gear 54 and the pawl 52. The motor 98 and clutch assembly 102 are energized by the vehicle's electrical system which is schematically represented as a voltage source 107. The motor 98, clutch assembly 102 and the drive shaft 100 are mounted within the door 12. A portion of the drive shaft 100 is carried in the door latch assembly 22 to support the drive gear 104 in the housing 36 and engage the sector gear 54 with the drive gear 104.

A controller 108 controls the motor 98 and clutch assembly 102 by energizing and de-energizing the same in response to switching signals from the switches 18 and 32 on the door 12, a remote control 199 and the switch members 76, 78 in the door latch assembly 22.

The covers 38, 40 are preferably made of steel or other appropriate material. The ratchet 50 and first pawl member 52 are preferably made of steel or other suitable metal, having a plastic cover 94. The release lever 62 and the sector gear 54 can be made of any suitable plastic or metal. The conventional bushings 56, 58 are integral with the housing 36 and are preferably a composite material such as nylon.

The Primary Latched Position

FIG. 8 shows the neutral or equilibrium configuration of the door latch assembly 22 when the door is closed and latched. The ratchet 50 is in a primary latched position and the striker 106 is held in a notch 110 in the ratchet 50 to hold the door closed. The ratchet 50 is held in the primary latched position by the pawl 52.

Arm 112 on the release lever 62 holds the switch 78 in a depressed position. Release clearance area 114 of the ratchet 50 maintains the first switch 76 in a depressed position. The sector gear 54 is in the null position.

There is a small gap or design clearance 116 between the opening arm 70 on the sector gear 54 and arm 117 when the latch assembly 22 is in the primary latched position and the sector gear 54 is in the null position.

In this position, the clutch assembly 102 is de-energized to prevent any torque from the ratchet 50 or the sector gear 50 from being applied to the motor 98.

Unlatching and Opening the Door with Power Assistance

To unlatch the door latch assembly 22 with power assistance, any one of the switches 18 or 32 on the door 12 or a switch 119 on the remote control 199 is actuated. Each switch 18, 32, 119 functions as an energizing switch and is independently operable to energize the motor 98.

When the motor and clutch assembly 102 are energized, the motor 98 rotates the drive gear 104 in a first rotational direction to drive the sector gear 54 out of the null position in an opening direction through an opening stroke to an opening position. The opening direction of the sector gear 54 is the counterclockwise direction in FIGS. 8-9.

As the sector gear 54 pivots from the null position to its opening position, the releasing arm 70 contacts the arm 117 of release lever to pivot the pawl 52 from its latching position to its releasing position. Ratchet 50 pivots from the primary latched position to an unlatched position to release the striker 106 so the door can be opened.

Although the ratchet spring 118 provides enough force to pivot the ratchet 50 from the primary latched position to the unlatched position when the pawl 52 is moved to the releasing position, it can be understood that the seal pressure exerted by the door seal on the door also tends to move the door latch assembly 22 and the striker apart when the door is unlatched which tends to rotate the ratchet 50 to the unlatched position. However, it will also be appreciated that due to the torque amplification of the drive gear 104 acting upon the sector gear 54, the potential energy stored in the ratchet spring 118 will be greater than prior art devices. Consequently, the ratchet 50 will be able to pivot to the unlatched position with greater force than prior art devices and without increasing the size of the motor 98.

When the pawl 52 is in the releasing position, the arm 112 is moved away from the second switch 78 to toggle the second switch 78. When the ratchet 50 pivots from the primary latched position to the unlatched position, the cam surface of the release clearance area 114 of the ratchet 50 moves out of contact with the first switch 76 to toggle the first switch 76. In response to the toggling of the first switch 76, the control circuitry 108 de-energizes the motor 98. The actuator 96 holds the sector gear 54 in its opening position until the ratchet 50 has pivoted to the unlatched position. When the clutch assembly 102 is disengaged, the sector gear 54 pivots from the opening position through a return stroke back to its null position under the spring force provided by one of the sector springs 74. Consequently, any torque from the ratchet 50 or the sector gear 50 is precluded from being applied to the motor 98.

Closing and Relatching the Door with Power Assistance

Referring to FIGS. 10 to 13, the door latch assembly 22 engages striker 106 which enters the mouth 31 and engages the ratchet 50 which responsively pivots from the unlatched position

toward the primary latched position. Because of the door seal pressure and the relatively lightweight of the vehicle door, the door may not have sufficient momentum to rotate the ratchet 50 all the way to the primary latched position.

Usually, the ratchet 50 is rotated to allow the pawl 52 to abut secondary stop 128. The ratchet 50 is retained in the secondary latched position. When the door latch assembly 22 is in the secondary latched position, the striker 110 is captured in the notch 110 and the door is partially closed and cannot be reopened without moving the pawl 52 to its releasing position.

When the pawl 52 engages the secondary stop 128, the arm 112 depresses the second switch 78. In response, the controller 108 energizes the motor 98 and clutch assembly 102. The motor 98 rotates the drive gear 104 in a second direction to cause the sector gear 54 to pivot in a closing direction through a closing stroke in a closing direction. The cinching arm 72 on the sector gear 54 contacts cinching stop 132 of the ratchet 50 so that continued movement of the sector gear 54 in the closing direction pivots or cinches the ratchet 50 from the secondary latched position to the primary latched position. The pawl 52 engages primary detent 126 to retain the ratchet 50 in the primary latched position.

When the ratchet 50 returns to the primary latched position, the releasing stop 114 of the ratchet 50 depresses and toggles the first switch 76. Both switches 76, 78 are now depressed. The first switch 76 functions as the closing de-energizing switch which signals the controller 108, in responsive to the movement of the ratchet 50 moving into the primary latched position, to de-energize the motor 98 and disengage the clutch assembly 102. When the clutch assembly 102 is de-energized, springs 74 return the sector gear 54 from the closing position through a return stroke to the null position. The drive gear 104 and the drive shaft 100 freely rotate with the sector gear 54 as it returns to the null position. When the sector gear 54 is back in the null position, the door latch assembly 22 is again in the neutral or equilibrium position with any torque from the ratchet 50 or the sector gear 50 being precluded from being applied to the motor 98.

Unlatching and Opening the Door with Manual Override

The opening button 18 functions as an electrical switch when it is partially depressed through its actuation stroke and functions as a mechanical release means when it is fully depressed through its actuation stroke. Therefore, the opening button 18 is used to open the door with power assistance by partially depressing the button 18 through its actuation stroke and is used to open the door 12 manually with a mechanical override by fully depressing the button 18 through its full actuation stroke. The interior door release handle 34 on the inside of the door 12 is used to unlatch the door 12 manually with mechanical override.

The interior door release handle 34 is operatively connected through Bowden wire 80 to the pawl 52. By actuating the interior door release handle 34, the Bowden wire 80 is pulled to move the pawl 52 from its holding position to its releasing position to disengage the pawl 52 from the ratchet 50. The ratchet 50 then moves to its unlatched position under the spring force of the ratchet spring 118 and the seal load on the door 12.

The button 18 on the door 12 is mechanically linked in a conventional manner to the release wire 82. If the button 18 is fully depressed, it pulls the wire 82 in a direction to move the pawl 52 from its holding position to its releasing position to release the ratchet 50.

5 It can be appreciated that the manual override provided by the button 18 and the interior handle 34 can release the ratchet 50 from either the primary latched position or secondary latched position to open the door 12. Each manual release 18, 34 functions independently and each holds the pawl 52 in the releasing position as long as the manual release 18 or 34 is held in an actuated position by the person opening the door 12.

10 It is contemplated to use many conventional manual release handles to unlatch the door latch assembly 22. It is also contemplated to use the door latch assembly 22 with any conventional interior or exterior electronic door handle. The door latch assembly 22 can also be used with any conventional manual or power operated door locking and unlocking system.

15 It can be understood that to close the open door and relatch the same in the primary latched position without power assistance, for example, in the event of a power failure, the door 12 is simply closed with greater force than is ordinarily used when power assistance is available. The manual closing force applied to the door 12 must be sufficient to rotate the ratchet 50 to the primary latched position so the pawl 52 can move back into its holding position and engage the first tooth portion 109 of the ratchet 50. The door 12 must be closed hard enough to sufficiently compress the door seal on the door frame to allow relatching.

20 It is understood that the illustrated operation is exemplary only and not intended to be limiting. The door latch assembly 22 can be used in other applications. The door latch assembly can be used, for example, on a powered sliding door of a type frequently found in van-type vehicles where the latch has to be released before the power door opening mechanism can start. It is contemplated to use the door latch assembly in a vehicle door which includes a power
25 mechanism to move the door from the open position to the secondary latched position with power assistance.

The above-described embodiment of the invention is intended to be an example of the present invention and alterations and modifications may be effected thereto, by those of skill in the art, without departing from the scope of the invention.

WE CLAIM:

1. A power door latch assembly for engaging a door striker, comprising:
a ratchet for engaging the striker, the ratchet being rotatable between a closed position and an open position and including at least one detent surface and biasing means for biasing the
5 ratchet towards the open position;
a pawl for engaging the at least one detent surface to selectively resist rotation of the ratchet towards the open position;
a rotary actuator for rotating the ratchet towards the closed position and for disengaging the pawl from the at least one detent surface;
10 a drive actuator including a prime mover, an output member in engagement with the rotary actuator, and a releasable coupling coupled between the prime mover and the output member for selectively transferring torque between the prime mover and the rotary actuator; and
a drive controller for controlling operation of the drive actuator, the drive controller being coupled to the releasable coupling and being configured for disengaging the prime mover
15 from the rotary actuator when the ratchet is disposed in one of the closed and open positions.
2. The power door latch assembly according to claim 1, wherein the rotary actuator is rotatable through a null position wherein the rotary actuator is disengaged from the ratchet and the pawl.
3. The power door latch assembly according to claim 2, wherein the drive controller is
20 configured for disengaging the prime mover from the rotary actuator when the rotary actuator is disposed in the null position.
4. The power door latch assembly according to any one of claims 1 to 3, wherein the rotary actuator includes a lost motion linkage for allowing limited rotational movement of the ratchet relative to the rotary actuator when the ratchet is disposed in the open position.
- 25 5. The power door latch assembly according to claim 4, wherein one of the at least one detent surfaces is disposed for providing in cooperation with the pawl a partially open position between the open and closed positions, and the limited rotational movement is provided between the open and partially open positions.
6. The power door latch assembly according to any one of claims 2 to 5, wherein the drive
30 controller includes a first switch for selectively operating the prime mover, and the pawl includes a finger disposed for engagement with the first switch when the rotary actuator is disposed in the null position.
7. The power door latch assembly according to any one of claims 2 to 6, wherein the drive controller includes a second switch for selectively operating the releasable coupling, and the
35 ratchet includes a cam surface disposed for engagement with the second switch when the ratchet is disposed in the closed position.
8. The power door latch assembly according to any one of claims 1 to 7, including a manual release lever, and the pawl includes an arm coupled to the release lever for releasing the pawl from the ratchet upon activation of the release lever.

9. The power door latch assembly according to any one of claims 1 to 8, wherein the ratchet is disposed for rotation about a first axis, and the pawl is disposed for rotation for about a fixed axis parallel to the first axis.
10. The power door latch assembly according to claim 9, wherein the drive actuator is
5 disposed for rotation about the first axis.
11. A door assembly comprising:
a door pivotable about a door axis and including a latch operation lever and an aperture for receiving a striker plate therein; and
a power door latch assembly according to any of the preceding claims, the power door
10 latch assembly being disposed within the door and being in communication with the latch actuation lever for selectively securing the door to the striker plate in accordance with a state of the actuation lever.

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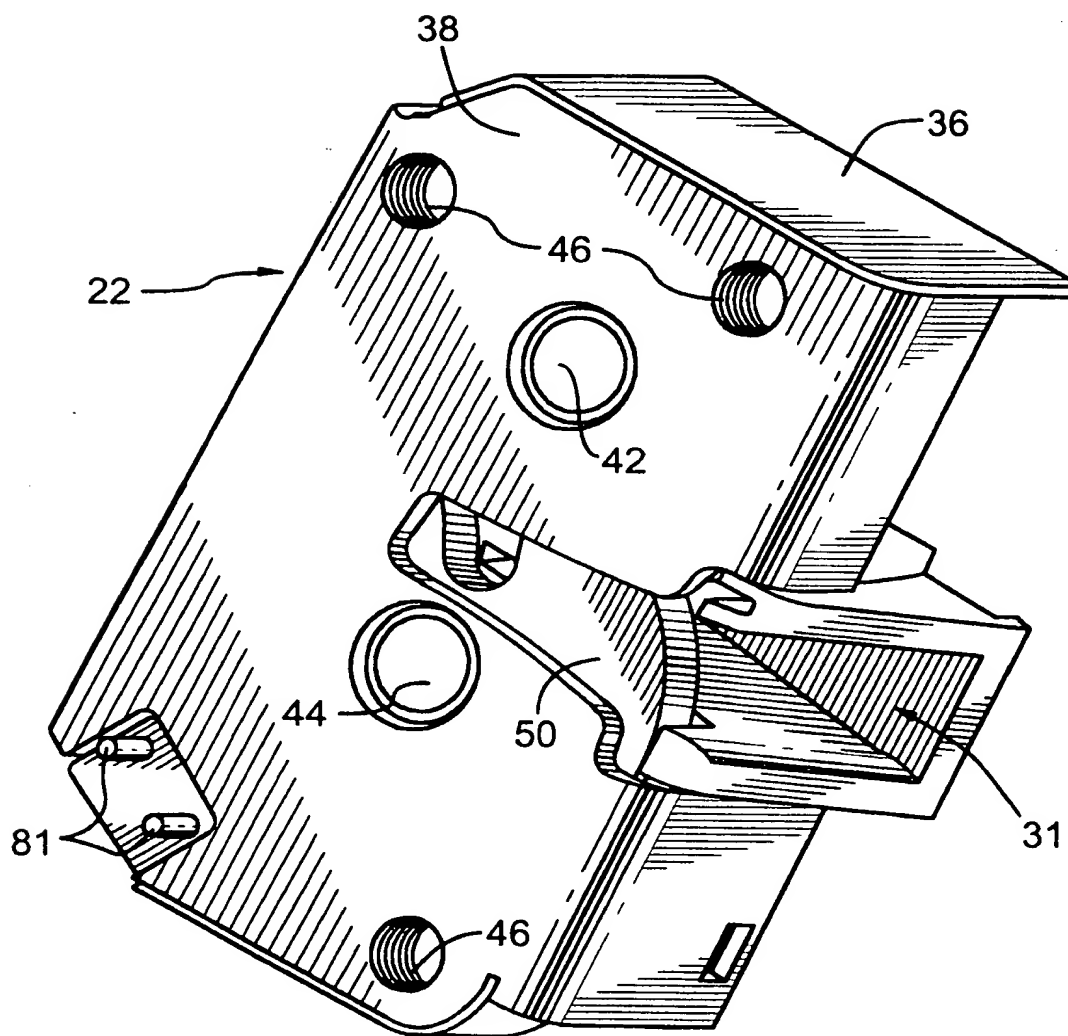


FIG.3

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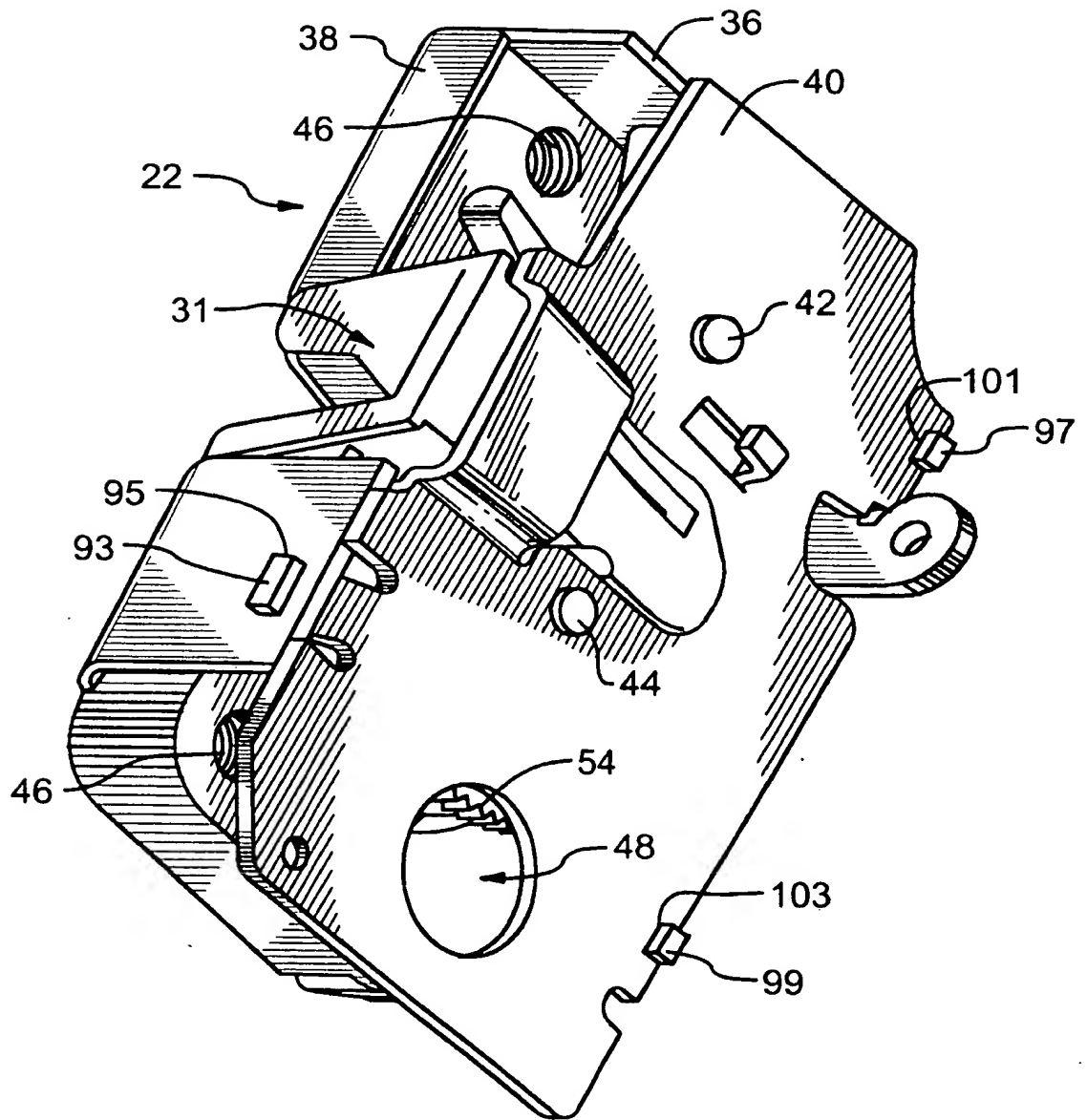


FIG.4

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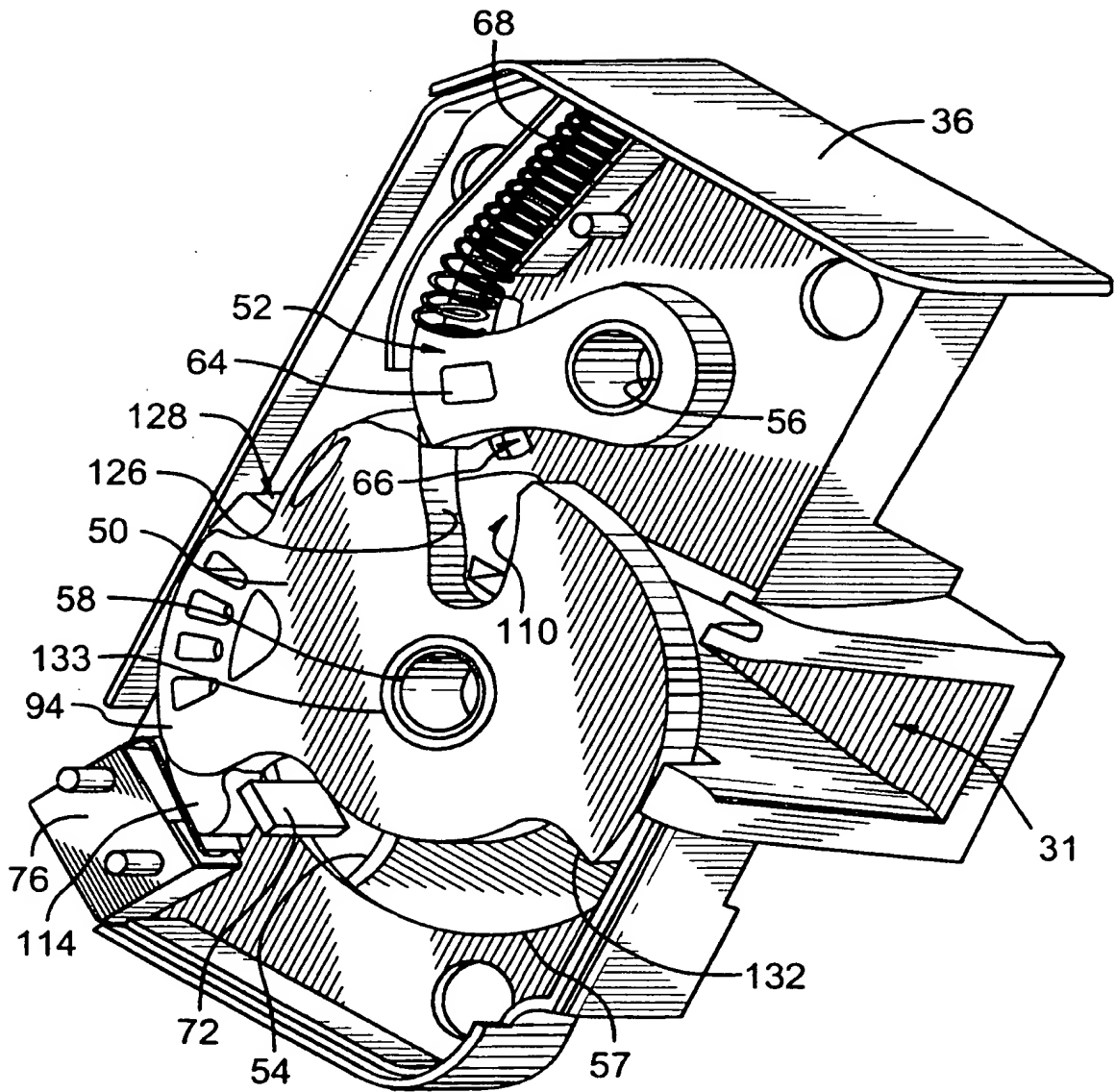


FIG.5

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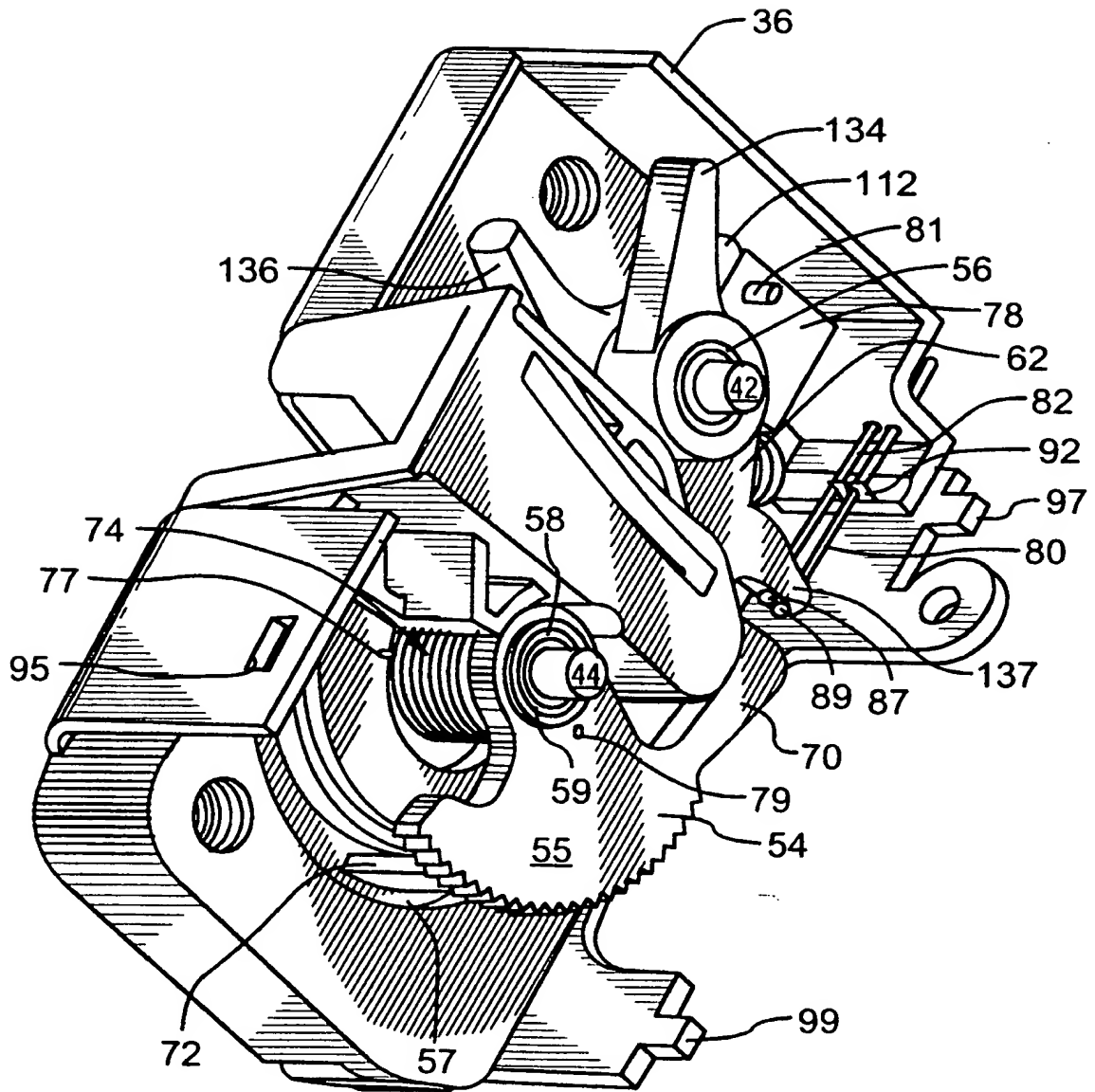


FIG. 6

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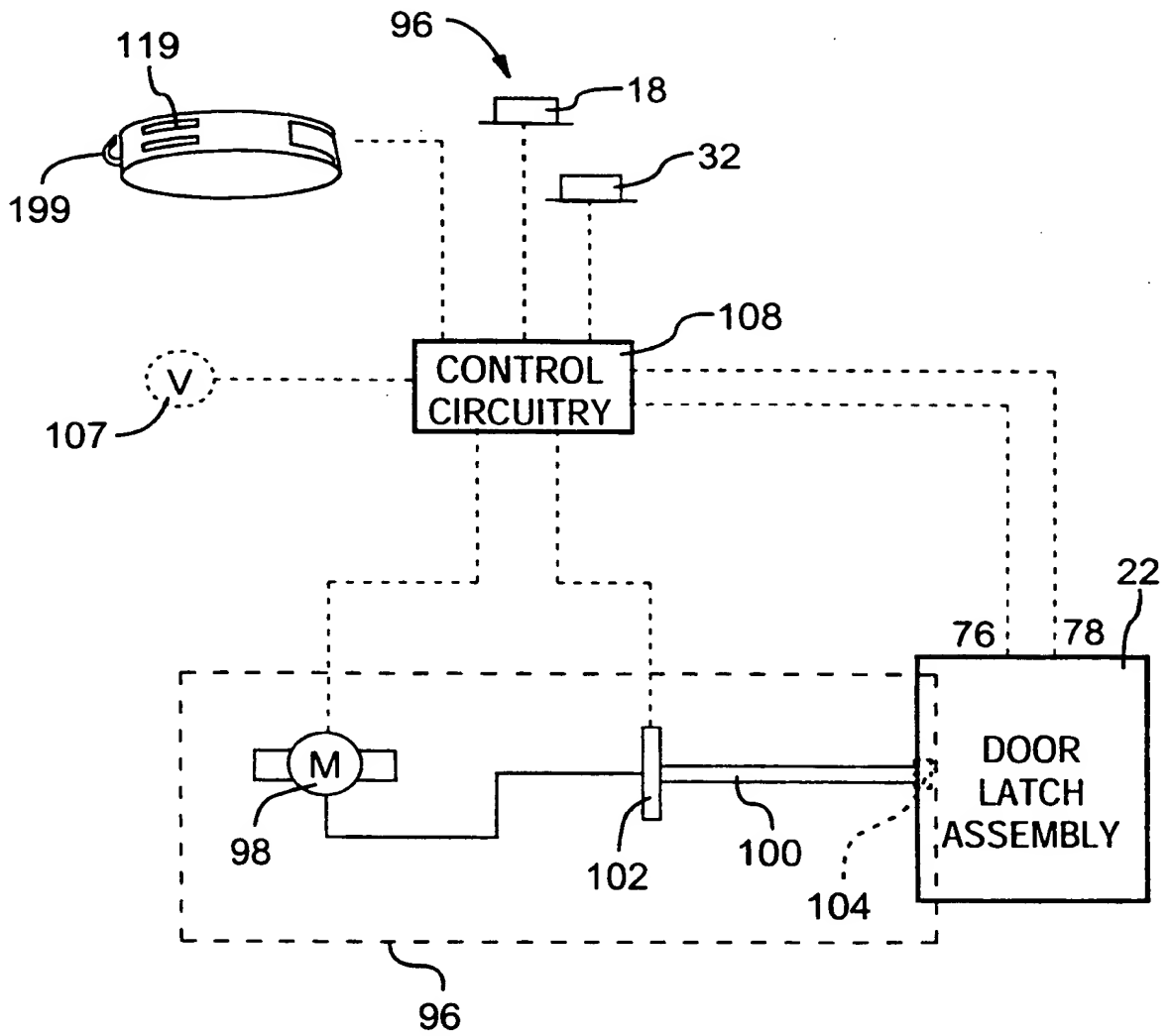


FIG. 7

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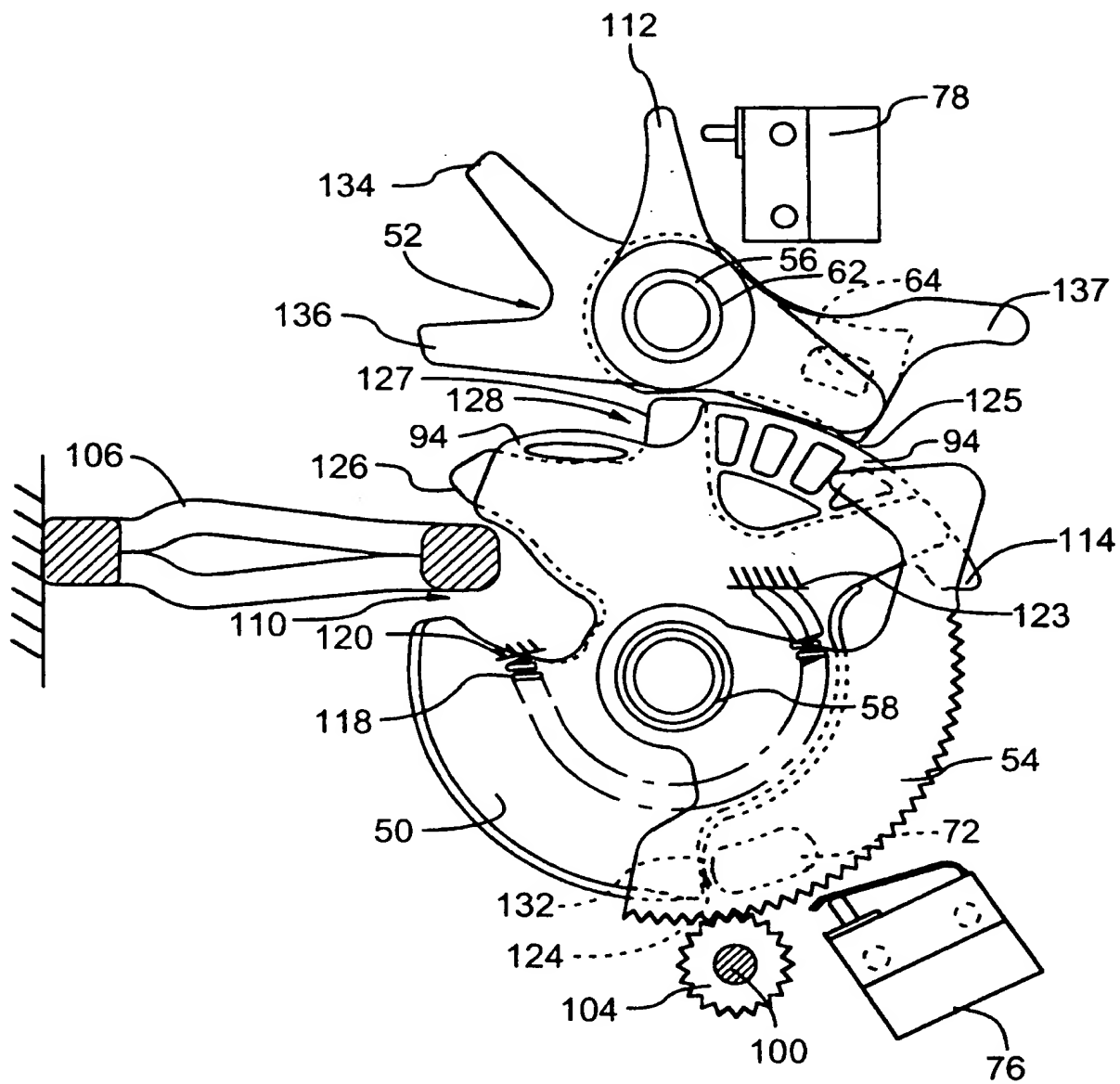


FIG.10

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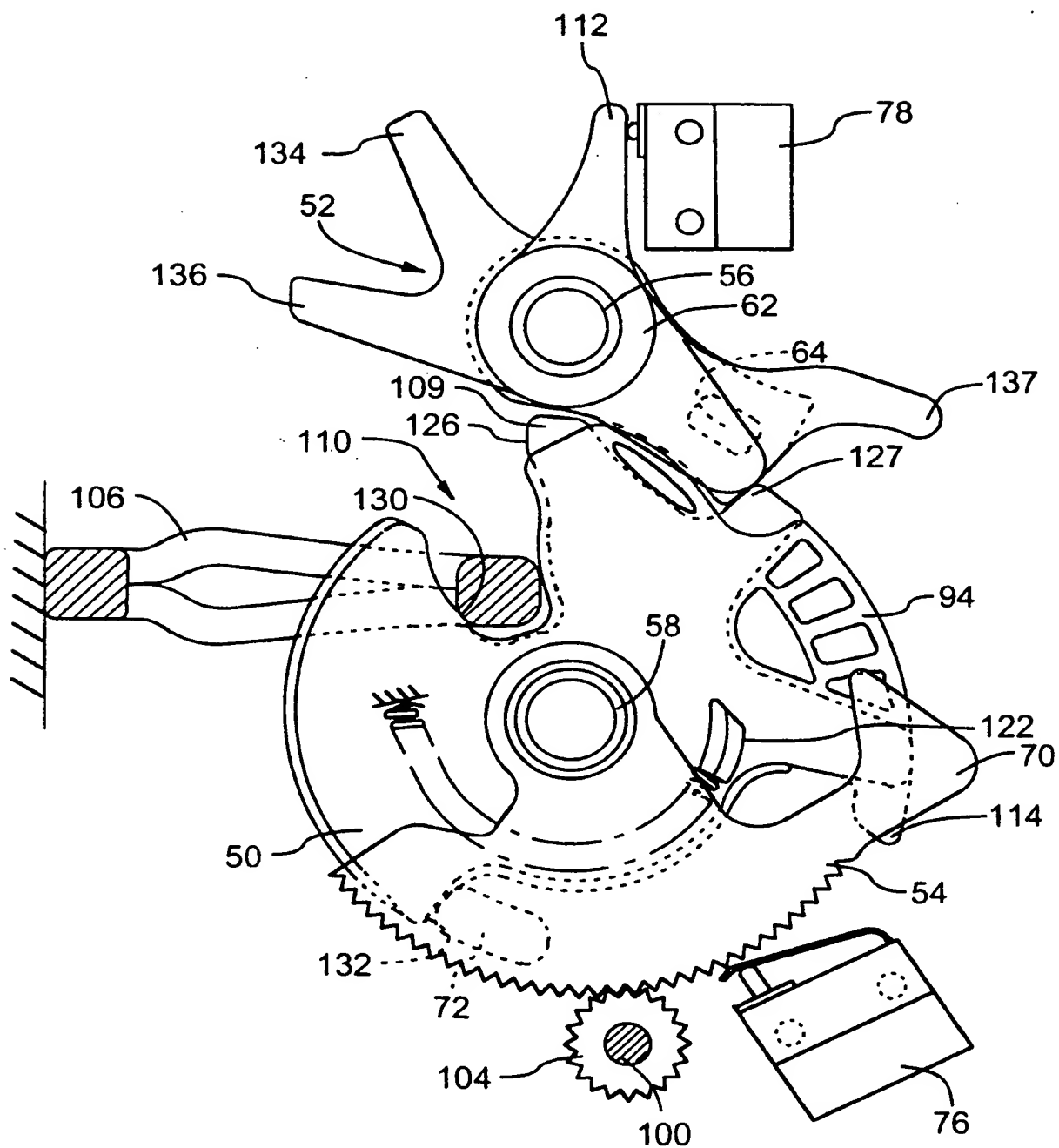


FIG. 12

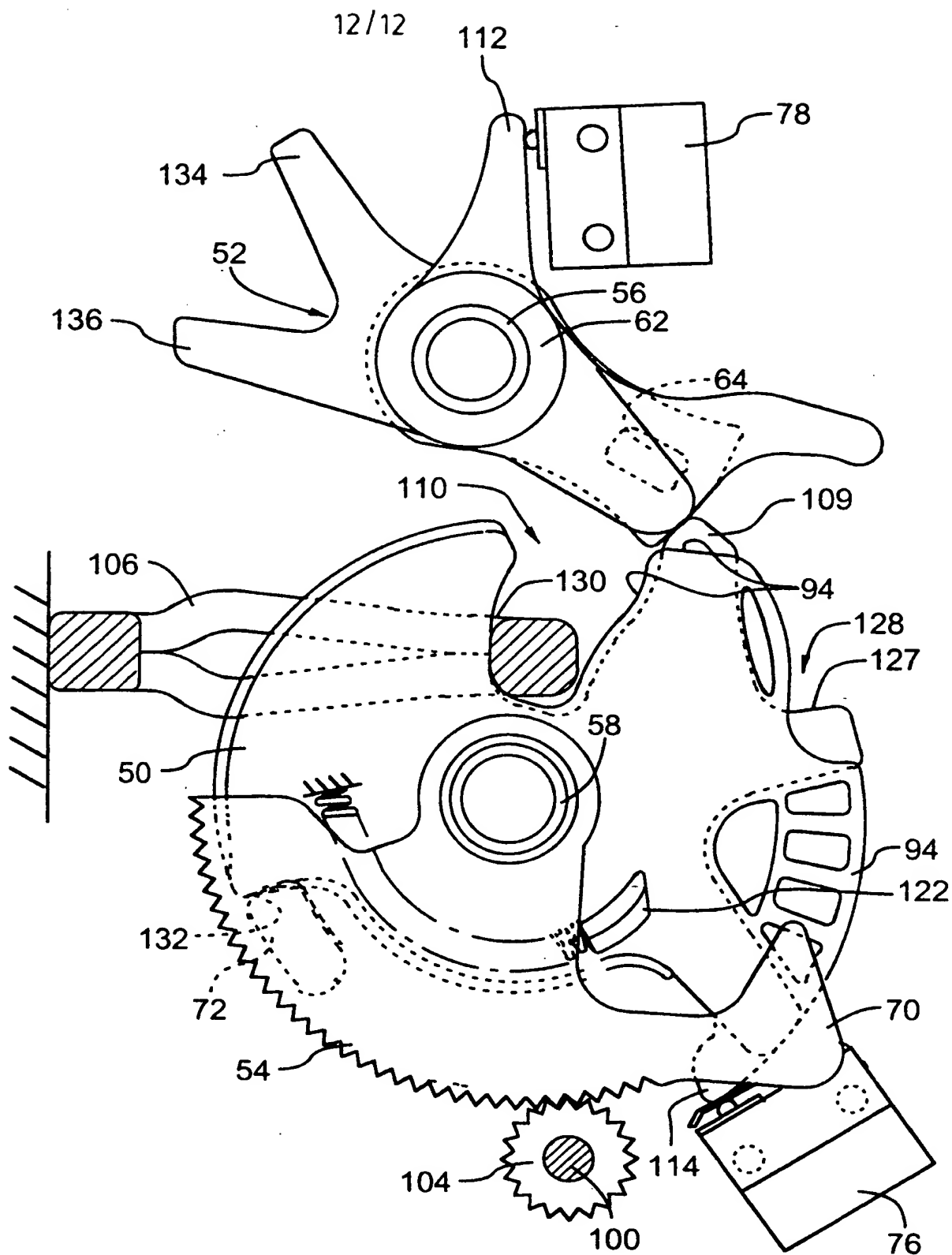


FIG. 13

INTERNATIONAL SEARCH REPORT

Int. Patent Application No

PCT/CA 00/00164

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 E05B65/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 197 11 563 A (BOSCH GMBH ROBERT) 24 September 1998 (1998-09-24) column 2, line 37 - line 50; figures 1,2	1,11
A	US 4 530 185 A (TAKEDA YOSHIMITSU ET AL) 23 July 1985 (1985-07-23) column 7, line 45 -column 9, line 7; figure	1,11
A	GB 2 320 943 A (CHEVALIER JOHN PHILLIP) 8 July 1998 (1998-07-08) page 20, line 24 -page 22, line 15 page 27, line 12 - line 17 page 53, line 4 - line 22; figures 11,49,50	1,11
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

9 June 2000

Date of mailing of the international search report

23/06/2000

Name and mailing address of the ISA

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Pieracci, A

INTERNATIONAL SEARCH REPORT

In. International Application No

PCT/CA 00/00164

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 518 180 A (KLEEFELDT FRANK ET AL) 21 May 1985 (1985-05-21) column 4, line 57 - column 5, line 5 column 5, line 45 - line 52; figures 1-5 ---	1,11
A	US 4 763 936 A (LICATA JOSEPH P ET AL) 16 August 1988 (1988-08-16) column 6, line 33 - line 46 column 7, line 18 - line 41; figures 3-5 -----	1,11

INTERNATIONAL SEARCH REPORT

Information on patent family members

In. International Application No

PCT/CA 00/00164

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19711563 A	24-09-1998	WO 9842939 A EP 0920561 A	01-10-1998 09-06-1999
US 4530185 A	23-07-1985	JP 1012912 B JP 1611793 C JP 58076669 A DE 3276382 D EP 0078662 A	02-03-1989 30-07-1991 09-05-1983 25-06-1987 11-05-1983
GB 2320943 A	08-07-1998	GB 2322409 A AU 7739098 A EP 0968348 A WO 9827301 A	26-08-1998 15-07-1998 05-01-2000 25-06-1998
US 4518180 A	21-05-1985	DE 3150620 A DE 3150621 A FR 2518621 A GB 2112443 A, B IT 1152583 B JP 1721407 C JP 4008586 B JP 58106074 A JP 1725631 C JP 3076979 A JP 4009912 B	30-06-1983 30-06-1983 24-06-1983 20-07-1983 07-01-1987 24-12-1992 17-02-1992 24-06-1983 19-01-1993 02-04-1991 21-02-1992
US 4763936 A	16-08-1988	NONE	

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

14

Applicant's or agent's file reference 701331PCT		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/CA00/00164	International filing date (day/month/year) 18/02/2000	Priority date (day/month/year) 18/02/1999	
International Patent Classification (IPC) or national classification and IPC E05B65/12			
Applicant ATOMA INTERNATIONAL CORP. et al.			



1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 11/09/2000	Date of completion of this report 30.05.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Vacca, R Telephone No. +49 89 2399 2863 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/CA00/00164

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-9	as originally filed			
10	as received on	01/03/2001	with letter of	01/03/2001

Claims, No.:

9-11	as originally filed			
1-8	as received on	01/03/2001	with letter of	01/03/2001

Drawings, sheets:

1/12-12/12	as originally filed
------------	---------------------

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA00/00164

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-11
	No:	Claims	
Inventive step (IS)	Yes:	Claims	2-6,8,10
	No:	Claims	1,7,9,11
Industrial applicability (IA)	Yes:	Claims	1-11
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA00/00164

1. Reference is made to the following documents:

D1 = DE-A-197 11 563

D2 = GB-A-2 320 943.

2. The present application does not satisfy the criterion set forth in Article 33(3) PCT, because the subject-matter of claim 1 does not involve an inventive step (Rule 65(1)(2) PCT).

- 2.1 From D1 a power door latch assembly for engaging a door striker is known, comprising: a ratchet (1) for engaging the striker, the ratchet being rotatable between a closed position and an open position and including at least one detent surface (13,15) and biasing means for biasing the ratchet towards the open position; a pawl (2) for engaging the at least one detent surface to selectively resist rotation of the ratchet towards the open position; a drive actuator (4) including a prime mover (5), an output member (9) in engagement with the rotary actuator, and a releasable coupling (21) coupled between the prime mover and the output member for selectively transferring torque between the prime mover and the rotary actuator; and a drive controller for controlling operation of the drive actuator (4), the drive controller being coupled to the releasable coupling and being configured for disengaging the prime mover (5) from the rotary actuator when the ratchet is disposed in one of the closed and open positions, the assembly further comprising a rotary actuator (12) having a cinching arm engaging the ratchet upon rotation of the actuator (12) in a first sense to rotate the ratchet towards the closed position.

- 2.2 The subject-matter of claim 1 is distinguished therefrom in that:

- the rotary actuator has a releasing arm engaging the pawl upon rotation of the actuator in a second sense opposite to the first one to disengage the pawl from the at least one detent surface.

- 2.3 However, such a feature has already been employed for the same purpose in a similar apparatus: see document D2, rotary actuator 50, cinching arm 30, ratchet 11, releasing arm 30, pawl 20, detent surfaces 13,14.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA00/00164

It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to apply these features with corresponding effect to an apparatus according to document D1, thereby arriving at assembly according to claim 1.

- 2.4 Therefore, the subject-matter of claim 1 does not involve an inventive step (Article 33(3) PCT).
3. Claims 7, 9 and 11 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step.
The subject-matter of claims 7 and 9 is anticipated by D1: see switch 16, cam surface 17, ratchet 1, pawl 2.
The subject-matter of claim 11 is substantially known from D1 and D2, as detailed in paragraph 2 above.
4. The subject-matter of the dependent claims 2 to 6, 8 and 10 does not appear to be anticipated nor suggested by the prior art presently available.
5. The features of the claims should have been provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
6. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor is this document identified therein.

The button 18 on the door 12 is mechanically linked in a conventional manner to the release wire 82. If the button 18 is fully depressed, it pulls the wire 82 in a direction to move the pawl 52 from its holding position to its releasing position to release the ratchet 50.

It can be appreciated that the manual override provided by the button 18 and the interior handle 34 can release the ratchet 50 from either the primary latched position or secondary latched position to open the door 12. Each manual release 18, 34 functions independently and each holds the pawl 52 in the releasing position as long as the manual release 18 or 34 is held in an actuated position by the person opening the door 12.

It is contemplated to use many conventional manual release handles to unlatch the door latch assembly 22. It is also contemplated to use the door latch assembly 22 with any conventional interior or exterior electronic door handle. The door latch assembly 22 can also be used with any conventional manual or power operated door locking and unlocking system.

It can be understood that to close the open door and relatch the same in the primary latched position without power assistance, for example, in the event of a power failure, the door 12 is simply closed with greater force than is ordinarily used when power assistance is available. The manual closing force applied to the door 12 must be sufficient to rotate the ratchet 50 to the primary latched position so the pawl 52 can move back into its holding position and engage the first tooth portion 109 of the ratchet 50. The door 12 must be closed hard enough to sufficiently compress the door seal on the door frame to allow relatching.

It is understood that the illustrated operation is exemplary only and not intended to be limiting. The door latch assembly 22 can be used in other applications. The door latch assembly can be used, for example, on a powered sliding door of a type frequently found in van-type vehicles where the latch has to be released before the power door opening mechanism can start. It is contemplated to use the door latch assembly in a vehicle door which includes a power mechanism to move the door from the open position to the secondary latched position with power assistance.

The above-described embodiment of the invention is intended to be an example of the present invention and alterations and modifications may be effected thereto, by those of skill in the art, without departing from the scope of the invention, as defined in the appended claims.

01-03-2001

CA 000000164

WE CLAIM:

1. A power door latch assembly for engaging a door striker, comprising:
a ratchet for engaging the striker, the ratchet being rotatable between a closed position and an open position and including at least one detent surface and biasing means for biasing the ratchet towards the open position;
a pawl for engaging the at least one detent surface to selectively resist rotation of the ratchet towards the open position;
a drive actuator including a prime mover, an output member in engagement with the rotary actuator, and a releasable coupling coupled between the prime mover and the output member for selectively transferring torque between the prime mover and the rotary actuator;
a drive controller for controlling operation of the drive actuator, the drive controller being coupled to the releasable coupling and being configured for disengaging the prime mover from the rotary actuator when the ratchet is disposed in one of the closed and open positions; and
a rotary actuator characterized by said rotary actuator having a cinching arm engaging said ratchet upon rotation of said rotary actuator in a first sense to rotate the ratchet towards the closed position, and said rotary actuator having a releasing arm engaging said pawl upon rotation of said rotary actuator in a second sense opposite said first sense to disengage the pawl from the at least one detent surface.
2. The power door latch assembly according to claim 1, wherein the rotary actuator is rotatable through a null position wherein the rotary actuator is disengaged from the ratchet and the pawl.
3. The power door latch assembly according to claim 2, wherein the drive controller is configured for disengaging the prime mover from the rotary actuator when the rotary actuator is disposed in the null position.
4. The power door latch assembly according to any one of claims 1 to 3, wherein the rotary actuator includes a lost motion linkage for allowing limited rotational movement of the ratchet relative to the rotary actuator when the ratchet is disposed in the open position.
5. The power door latch assembly according to claim 4, wherein one of the at least one detent surfaces is disposed for providing in cooperation with the pawl a partially open position between the open and closed positions, and the limited rotational movement is provided between the open and partially open positions.
6. The power door latch assembly according to any one of claims 2 to 5, wherein the drive controller includes a first switch for selectively operating the prime mover, and the pawl includes a finger disposed for engagement with the first switch when the rotary actuator is disposed in the null position.
7. The power door latch assembly according to any one of claims 2 to 6, wherein the drive controller includes a second switch for selectively operating the releasable coupling, and the ratchet includes a cam surface disposed for engagement with the second switch when the ratchet is disposed in the closed position.
8. The power door latch assembly according to any one of claims 1 to 7, including a manual release lever, and the pawl includes an arm coupled to the release lever for releasing the pawl from the ratchet upon activation of the release lever.

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

IMAI, Jeffrey T.
Magna International Inc.
337 Magna Drive
Aurora, Ontario L4G 7K1
CANADA

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Rule 71.1)

Date of mailing (day/month/year)	30.05.2001
-------------------------------------	------------

Applicant's or agent's file reference 701331PCT	IMPORTANT NOTIFICATION
--	-------------------------------

International application No. PCT/CA00/00164	International filing date (day/month/year) 18/02/2000	Priority date (day/month/year) 18/02/1999
---	--	--

Applicant ATOMA INTERNATIONAL CORP. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
---------------------------------------	--------------------



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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 701331PCT		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/CA00/00164	International filing date (day/month/year) 18/02/2000	Priority date (day/month/year) 18/02/1999	
International Patent Classification (IPC) or national classification and IPC E05B65/12			
Applicant ATOMA INTERNATIONAL CORP. et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 2 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input checked="" type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application 			
Date of submission of the demand 11/09/2000		Date of completion of this report 30.05.2001	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer Vacca, R Telephone No. +49 89 2399 2863 	

Form PCT/PEA/409 (cover sheet) (January 1994)

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/CA00/00164

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17):*

Description, pages:

1-9	as originally filed			
10	as received on	01/03/2001	with letter of	01/03/2001

Claims, No.:

9-11	as originally filed			
1-8	as received on	01/03/2001	with letter of	01/03/2001

Drawings, sheets:

1/12-12/12	as originally filed
------------	---------------------

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/CA00/00164

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-11
	No:	Claims
Inventive step (IS)	Yes:	Claims 2-6,8,10
	No:	Claims 1,7,9,11
Industrial applicability (IA)	Yes:	Claims 1-11
	No:	Claims

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA00/00164

1. Reference is made to the following documents:

D1 = DE-A-197 11 563

D2 = GB-A-2 320 943.

2. The present application does not satisfy the criterion set forth in Article 33(3) PCT, because the subject-matter of claim 1 does not involve an inventive step (Rule 65(1)(2) PCT).

- 2.1 From D1 a power door latch assembly for engaging a door striker is known, comprising: a ratchet (1) for engaging the striker, the ratchet being rotatable between a closed position and an open position and including at least one detent surface (13,15) and biasing means for biasing the ratchet towards the open position; a pawl (2) for engaging the at least one detent surface to selectively resist rotation of the ratchet towards the open position; a drive actuator (4) including a prime mover (5), an output member (9) in engagement with the rotary actuator, and a releasable coupling (21) coupled between the prime mover and the output member for selectively transferring torque between the prime mover and the rotary actuator; and a drive controller for controlling operation of the drive actuator (4), the drive controller being coupled to the releasable coupling and being configured for disengaging the prime mover (5) from the rotary actuator when the ratchet is disposed in one of the closed and open positions, the assembly further comprising a rotary actuator (12) having a cinching arm engaging the ratchet upon rotation of the actuator (12) in a first sense to rotate the ratchet towards the closed position.

- 2.2 The subject-matter of claim 1 is distinguished therefrom in that:

- the rotary actuator has a releasing arm engaging the pawl upon rotation of the actuator in a second sense opposite to the first one to disengage the pawl from the at least one detent surface.

- 2.3 However, such a feature has already been employed for the same purpose in a similar apparatus: see document D2, rotary actuator 50, cinching arm 30, ratchet 11, releasing arm 30, pawl 20, detent surfaces 13,14.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/CA00/00164

It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to apply these features with corresponding effect to an apparatus according to document D1, thereby arriving at assembly according to claim 1.

- 2.4 Therefore, the subject-matter of claim 1 does not involve an inventive step (Article 33(3) PCT).
3. Claims 7, 9 and 11 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step.
The subject-matter of claims 7 and 9 is anticipated by D1: see switch 16, cam surface 17, ratchet 1, pawl 2.
The subject-matter of claim 11 is substantially known from D1 and D2, as detailed in paragraph 2 above.
4. The subject-matter of the dependent claims 2 to 6, 8 and 10 does not appear to be anticipated nor suggested by the prior art presently available.
5. The features of the claims should have been provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
6. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor is this document identified therein.

The button 18 on the door 12 is mechanically linked in a conventional manner to the release wire 82. If the button 18 is fully depressed, it pulls the wire 82 in a direction to move the pawl 52 from its holding position to its releasing position to release the ratchet 50.

5 It can be appreciated that the manual override provided by the button 18 and the interior handle 34 can release the ratchet 50 from either the primary latched position or secondary latched position to open the door 12. Each manual release 18, 34 functions independently and each holds the pawl 52 in the releasing position as long as the manual release 18 or 34 is held in an actuated position by the person opening the door 12.

10 It is contemplated to use many conventional manual release handles to unlatch the door latch assembly 22. It is also contemplated to use the door latch assembly 22 with any conventional interior or exterior electronic door handle. The door latch assembly 22 can also be used with any conventional manual or power operated door locking and unlocking system.

15 It can be understood that to close the open door and relatch the same in the primary latched position without power assistance, for example, in the event of a power failure, the door 12 is simply closed with greater force than is ordinarily used when power assistance is available. The manual closing force applied to the door 12 must be sufficient to rotate the ratchet 50 to the primary latched position so the pawl 52 can move back into its holding position and engage the first tooth portion 109 of the ratchet 50. The door 12 must be closed hard enough to sufficiently compress the door seal on the door frame to allow relatching.

20 It is understood that the illustrated operation is exemplary only and not intended to be limiting. The door latch assembly 22 can be used in other applications. The door latch assembly can be used, for example, on a powered sliding door of a type frequently found in van-type vehicles where the latch has to be released before the power door opening mechanism can start. It is contemplated to use the door latch assembly in a vehicle door which includes a power
25 mechanism to move the door from the open position to the secondary latched position with power assistance.

The above-described embodiment of the invention is intended to be an example of the present invention and alterations and modifications may be effected thereto, by those of skill in the art, without departing from the scope of the invention.

WE CLAIM:

1. A power door latch assembly for engaging a door striker, comprising:
a ratchet for engaging the striker, the ratchet being rotatable between a closed position
and an open position and including at least one detent surface and biasing means for biasing the
5 ratchet towards the open position;
a pawl for engaging the at least one detent surface to selectively resist rotation of the
ratchet towards the open position;
a rotary actuator for rotating the ratchet towards the closed position and for disengaging
the pawl from the at least one detent surface;
10 a drive actuator including a prime mover, an output member in engagement with the
rotary actuator, and a releasable coupling coupled between the prime mover and the output
member for selectively transferring torque between the prime mover and the rotary actuator; and
a drive controller for controlling operation of the drive actuator, the drive controller
being coupled to the releasable coupling and being configured for disengaging the prime mover
15 from the rotary actuator when the ratchet is disposed in one of the closed and open positions.
2. The power door latch assembly according to claim 1, wherein the rotary actuator is
rotatable through a null position wherein the rotary actuator is disengaged from the ratchet and
the pawl.
3. The power door latch assembly according to claim 2, wherein the drive controller is
20 configured for disengaging the prime mover from the rotary actuator when the rotary actuator is
disposed in the null position.
4. The power door latch assembly according to any one of claims 1 to 3, wherein the rotary
actuator includes a lost motion linkage for allowing limited rotational movement of the ratchet
relative to the rotary actuator when the ratchet is disposed in the open position.
- 25 5. The power door latch assembly according to claim 4, wherein one of the at least one
detent surfaces is disposed for providing in cooperation with the pawl a partially open position
between the open and closed positions, and the limited rotational movement is provided between
the open and partially open positions.
6. The power door latch assembly according to any one of claims 2 to 5, wherein the drive
30 controller includes a first switch for selectively operating the prime mover, and the pawl includes
a finger disposed for engagement with the first switch when the rotary actuator is disposed in the
null position.
7. The power door latch assembly according to any one of claims 2 to 6, wherein the drive
controller includes a second switch for selectively operating the releasable coupling, and the
35 ratchet includes a cam surface disposed for engagement with the second switch when the ratchet
is disposed in the closed position.
8. The power door latch assembly according to any one of claims 1 to 7, including a manual
release lever, and the pawl includes an arm coupled to the release lever for releasing the pawl
from the ratchet upon activation of the release lever.

INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/CA 00/00164

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 E05B65/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 197 11 563 A (BOSCH GMBH ROBERT) 24 September 1998 (1998-09-24) column 2, line 37 - line 50; figures 1,2 ---	1,11
A	US 4 530 185 A (TAKEDA YOSHIMITSU ET AL) 23 July 1985 (1985-07-23) column 7, line 45 - column 9, line 7; figure ---	1,11
A	GB 2 320 943 A (CHEVALIER JOHN PHILLIP) 8 July 1998 (1998-07-08) page 20, line 24 - page 22, line 15 page 27, line 12 - line 17 page 53, line 4 - line 22; figures 11,49,50 --- -/--	1,11

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

9 June 2000

Date of mailing of the international search report

23/06/2000

Name and mailing address of the ISA

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Tel. (+31-70) 340-2040, Tx. 31 651 epo nl
Fax: (+31-70) 340-3016

Authorized officer

Pieracci, A

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 00/00164

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 518 180 A (KLEEFELDT FRANK ET AL) 21 May 1985 (1985-05-21) column 4, line 57 -column 5, line 5 column 5, line 45 - line 52; figures 1-5 ---	1,11
A	US 4 763 936 A (LICATA JOSEPH P ET AL) 16 August 1988 (1988-08-16) column 6, line 33 - line 46 column 7, line 18 - line 41; figures 3-5 -----	1,11

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

In. .tional Application No

PCT/CA 00/00164

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19711563 A	24-09-1998	WO 9842939 A EP 0920561 A	01-10-1998 09-06-1999
US 4530185 A	23-07-1985	JP 1012912 B JP 1611793 C JP 58076669 A DE 3276382 D EP 0078662 A	02-03-1989 30-07-1991 09-05-1983 25-06-1987 11-05-1983
GB 2320943 A	08-07-1998	GB 2322409 A AU 7739098 A EP 0968348 A WO 9827301 A	26-08-1998 15-07-1998 05-01-2000 25-06-1998
US 4518180 A	21-05-1985	DE 3150620 A DE 3150621 A FR 2518621 A GB 2112443 A, B IT 1152583 B JP 1721407 C JP 4008586 B JP 58106074 A JP 1725631 C JP 3076979 A JP 4009912 B	30-06-1983 30-06-1983 24-06-1983 20-07-1983 07-01-1987 24-12-1992 17-02-1992 24-06-1983 19-01-1993 02-04-1991 21-02-1992
US 4763936 A	16-08-1988	NONE	

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 701331PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/CA 00/ 00164	International filing date (day/month/year) 18/02/2000	(Earliest) Priority Date (day/month/year) 18/02/1999
Applicant ATOMA INTERNATIONAL CORP. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

8

☐ as suggested by the applicant.

☐ None of the figures.

☐ because the applicant failed to suggest a figure.

☒ because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

ational application No.

PCT/CA 00/ 00164

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

A power door latch assembly consists of a ratchet (50) for engaging a door striker, a pawl (52), a rotary actuator (54) for rotating the ratchet (50) towards the closed position and for disengaging the pawl (52) and a drive actuator (96) for driving the rotary actuator (54). The drive actuator (96) includes a prime mover (98), an output member (104) in engagement with the rotary actuator (54), and a releasable coupling (102) coupled between the prime mover (98) and the output member (104) for selectively transferring torque between the prime mover (98) and the rotary actuator (54). A drive controller (108) is coupled to the releasable coupling (102) and is configured for disengaging the prime mover (98) from the rotary actuator (54) when the ratchet (50) is disposed in either the open or closed positions.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/CA 00/00164

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 E05B65/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 197 11 563 A (BOSCH GMBH ROBERT) 24 September 1998 (1998-09-24) column 2, line 37 - line 50; figures 1,2 ---	1,11
A	US 4 530 185 A (TAKEDA YOSHIMITSU ET AL) 23 July 1985 (1985-07-23) column 7, line 45 -column 9, line 7; figure ---	1,11
A	GB 2 320 943 A (CHEVALIER JOHN PHILLIP) 8 July 1998 (1998-07-08) page 20, line 24 -page 22, line 15 page 27, line 12 - line 17 page 53, line 4 - line 22; figures 11,49,50 --- -/--	1,11



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

9 June 2000

Date of mailing of the international search report

23/06/2000

Name and mailing address of the ISA

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Authorized officer

Pieracci, A

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/CA 00/00164

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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